

Centers for Chemical Innovation (CCI)

Chemistry as the Driver for Transformative Research and Innovation

PROGRAM SOLICITATION

NSF 11-552

REPLACES DOCUMENT(S):

NSF 10-585



National Science Foundation

Directorate for Mathematical & Physical Sciences
Division of Chemistry

Preliminary Proposal Due Date(s) (*required*) (due by 5 p.m. proposer's local time):

October 05, 2011

Phase I preliminary proposals

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

October 25, 2011

Phase II full proposal

March 27, 2012

Phase I full proposal, by invitation only

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), [NSF 11-1](#), was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in [NSF 11-1](#) apply to proposals submitted in response to this funding opportunity.

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* [Chapter II.C.2.g\(xi\)](#) for further information about the implementation of these recommendations.

Data Management Plan: The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

Postdoctoral Researcher Mentoring Plan: As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Centers for Chemical Innovation (CCI) Chemistry as the Driver for Transformative Research and Innovation

Synopsis of Program:

The Centers for Chemical Innovation (CCI) Program supports research centers focused on major, long-term fundamental chemical research challenges. CCIs that address these challenges will produce transformative research, lead to innovation, and attract broad scientific and public interest. CCIs are agile structures that can

respond rapidly to emerging opportunities and make full use of cyberinfrastructure to enhance collaborations. CCI may partner with researchers from industry, government laboratories and international organizations. CCIs integrate research, innovation, education, and public outreach and include a plan to broaden participation of underrepresented groups.

The CCI program is a two-phase program. Both phases are described in this solicitation. Phase I CCIs receive significant resources to develop the science and integrative elements of a CCI before requesting Phase II funding. Phase I proposals funded in FY 2012 will seek Phase II funding in FY 2015. Only organizations receiving Phase I awards in FY2009 are eligible to request Phase II funding in FY 2012.

For the FY 2012 Phase I competition, only projects addressing the theme of sustainable chemistry will be considered. The preliminary proposal and proposal must address how the topic addresses sustainable chemistry. Areas of focus include but are not limited to

1. Developing clean, safe, and economical alternatives to traditional chemical products and practices.
2. Exploring alternatives to petroleum as a source of feedstock chemicals, including biorenewables.
3. Exploring earth-abundant, inexpensive and benign alternatives to rare, expensive and toxic chemicals. Examples include indium, germanium, rare earth elements and platinum catalysts.
4. Developing efficient recognition/sequestration and recycling of key elements essential for sustainability, for example phosphorus and rare earth elements.

Projects involving alternative energy, climate change and other aspects of sustainability are best supported by the SEES solicitations and will not be considered in CCI in FY2012.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Katharine Covert, Program Director, 1055, telephone: (703) 292-4950, fax: (703) 292-9037, email: kcovert@nsf.gov
- Robert L. Kuczkowski, Program Director, Directorate for Mathematical & Physical Sciences, Division of Chemistry, telephone: (703) 292-4454, email: rkuczkow@nsf.gov
- C. Michelle Jenkins, 1055, telephone: (703) 292-7874, email: cjenkins@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.049 --- Mathematical and Physical Sciences

Award Information

Anticipated Type of Award: Phase I awards will be standard or continuing grants. Phase II awards will be cooperative agreements

Estimated Number of Awards: 3 to 7 in FY 2012, two to four Phase I awards (each award is \$1,750,000 over three years). NSF anticipates making one to three Phase II awards (\$4,000,000/yr for five years, renewable once for a total of 10 years), pending availability of funds.

Anticipated Funding Amount: \$11,000,000 to \$15,000,000 in FY 2012, pending availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

PI Limit:

While these proposals will reflect the research of many investigators, only the name of the PI should appear on the cover sheet. All other investigators are considered senior personnel. An investigator may participate (as PI or senior personnel) in only one CCI proposal submitted to this competition. The PI must be affiliated with an eligible submitting organization.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

Only one proposal per eligible PI.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
 - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Preliminary Proposal Due Date(s) (*required*)** (due by 5 p.m. proposer's local time):

October 05, 2011

Phase I preliminary proposals

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 25, 2011

Phase II full proposal

March 27, 2012

Phase I full proposal, by invitation only

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Award Information**
- IV. **Eligibility Information**
- V. **Proposal Preparation and Submission Instructions**
 - A. **Proposal Preparation Instructions**
 - B. **Budgetary Information**
 - C. **Due Dates**
 - D. **FastLane/Grants.gov Requirements**
- VI. **NSF Proposal Processing and Review Procedures**
 - A. **NSF Merit Review Criteria**
 - B. **Review and Selection Process**
- VII. **Award Administration Information**
 - A. **Notification of the Award**

- B. Award Conditions
- C. Reporting Requirements

VIII. Agency Contacts

IX. Other Information

I. INTRODUCTION

The Centers for Chemical Innovation (CCI) Program supports research centers focused on major, long-term fundamental chemical research challenges. CCIs that address these challenges will produce transformative research, lead to innovation, and attract broad scientific and public interest. CCIs are agile structures that can respond rapidly to emerging opportunities and make full use of cyberinfrastructure to enhance collaborations. CCIs may partner with researchers from industry, government laboratories and international organizations. CCIs integrate research, innovation, education, and public outreach and include a plan to broaden participation of underrepresented groups.

The CCI program is a two-phase program. Both phases are described in this solicitation. Phase I CCIs receive significant resources to develop the science and integrative elements of a CCI before requesting Phase II funding. Phase I proposals funded in FY 2012 will seek Phase II funding in FY 2015. Only organizations receiving Phase I awards in FY 2009 are eligible to request Phase II funding in FY 2012.

II. PROGRAM DESCRIPTION

CCI awards support the formation and development (Phase I) or sustained funding (Phase II) of research centers that can address major research challenges in fundamental chemistry. Successful centers will tackle challenges of large scope and impact, producing transformative research leading to innovation and enhanced economic competitiveness. CCI awards will bring researchers with shared and complementary interests into productive contact to nurture a culture of risk-taking and innovation.

For the FY 2012 Phase I competition, only projects addressing the theme of sustainable chemistry will be considered. The preliminary proposal and proposal must address how the topic addresses sustainable chemistry. Areas of focus include but are not limited to

1. Developing clean, safe, and economical alternatives to traditional chemical products and practices.
2. Exploring alternatives to petroleum as a source of feedstock chemicals, including biorenewables.
3. Exploring earth-abundant, inexpensive and benign alternatives to rare, expensive and toxic chemicals. Examples include indium, germanium, rare earth elements and platinum catalysts.
4. Developing efficient recognition/sequestration and recycling of key elements essential for sustainability, for example phosphorus and rare earth elements.

Projects involving alternative energy, climate change and other aspects of sustainability are best supported by the SEES solicitations and will not be considered in CCI in FY 2012.

Team size should reflect the needs of the problem to be studied, but a minimum of three investigators is required to initiate a Phase I CCI. CCIs may partner with researchers from industry, national laboratories and international organizations. See detailed guidance below for non-U.S. or non-academic researchers.

CCIs are expected to integrate their research with activities that broaden the impact of their research. The following integrative elements are required throughout the lifetime of a CCI award:

- Innovation - translation or transfer of basic research results into social or economic benefit. This element includes intellectual property protection and a proactive plan to either engage industry in technology transfer or to commercialize technology in other ways.
- Education - education and training for undergraduate and graduate students supported by the grant, including co-mentorship or other collaborative training. Education in various aspects of innovation (intellectual property, entrepreneurship, etc.) Other education activities (i.e., new course materials or curricula) that affect the university or universities involved in the CCI.
- Broadening the participation of underrepresented groups - CCI goals for increasing diversity, plans for reaching those goals, and an evaluation strategy.
- Public science outreach - plans for communicating the CCI research to public audiences and possible ways to evaluate the impact of these outreach efforts.
- Management - effective management plans include careful evaluation of the research and integrative elements, allocation of resources, the ability to initiate new lines of research and terminate support for less effective ones, and to promote communication throughout the center and with partners.

Investigators are strongly urged to contact a cognizant Program Officer (listed in Section VIII of this solicitation) when considering submitting a proposal.

CCIs may partner with researchers from industry or government laboratories. CCIs are encouraged to develop collaborations that involve sending U.S. students and junior researchers to conduct collaborative research with non-academic partners and to host non-academic researchers for research visits at CCI sites. No grant funds may be subawarded to industry or government laboratories. These team members must be supported by their own organization. Federal employees may not receive salaries or in other ways augment their agency's appropriation through grants made by this program, and no funds for major equipment at Federally Funded Research and Development Centers (FFRDCs) are allowed. However, it is appropriate for students and postdoctoral researchers supported through universities to work at a partner industrial laboratory, FFRDC or comparable site, or for universities to fund research expenses incurred when scientists from such entities work at university sites. Industrial and government partners will

provide a letter of collaboration in the supplementary documents section of the full proposal for Phase I or Phase II.

CCIs may also partner with researchers from international organizations. CCIs are encouraged to develop collaborations that involve sending U.S. students and junior researchers to conduct collaborative research at international partner organizations. NSF awards are normally limited to support of the U.S. portion of the collaboration. Although reciprocal visits by international researchers and students to the U.S. institutions are encouraged, NSF will not usually pay for the expenses of foreign scientists or students undertaking such visits. However, for projects involving exchanges of researchers and/or students, reciprocal arrangements for provision of housing and subsistence are encouraged, with adherence to the overall principle that each side supports equivalent costs. No grant funds may be subawarded to international organizations. In CCI projects where collaborators are scientists and engineers from a developing country or from a country whose currency is not convertible, limited funds may be requested to support their participation in the project; proposers should consult with the OISE program officer(s) responsible for the country(ies) in question (<http://www.nsf.gov/od/oise/country-list.jsp>.) International partners will provide a letter of collaboration in the supplementary documents section of the full proposal for Phase I or Phase II.

Principal Investigators should ensure that their proposed project does not substantially overlap with ongoing federally-funded research. Preliminary proposals and full proposals submitted in response to this solicitation may be shared with other federal agencies, including (but not limited to) the Department of Energy, National Institutes of Health, Air Force Office of Scientific Research, Office of Naval Research, and the Intelligence Community. Reviews, including panel summaries, if applicable, may also be shared. The reasons for sharing these proposals and reviews include potential co-funding as well as avoiding duplication of federal funding for a particular research project. If the PI or awardee organization does not wish the proposal to be shared with a particular federal agency or agencies, they should provide a Single Copy Document with the proposal stating which federal funding agencies should be excluded. No explanations for exclusion are required.

III. AWARD INFORMATION

NSF anticipates making 2-4 Phase I awards (each award is \$1,750,000 over three years). NSF anticipates making 1-3 Phase II awards (\$4,000,000/yr for five years, renewable once for a total of 10 years), pending availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

PI Limit:

While these proposals will reflect the research of many investigators, only the name of the PI should appear on the cover sheet. All other investigators are considered senior personnel. An investigator may participate (as PI or senior personnel) in only one CCI proposal submitted to this competition. The PI must be affiliated with an eligible submitting organization.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

Only one proposal per eligible PI.

Additional Eligibility Info:

Only teams receiving Phase I awards in FY 2009 are eligible to request Phase II funding in FY2012.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via the NSF FastLane system.

Preliminary proposals (Phase I, required) must be submitted via FastLane by 5:00 p.m. proposer's local time on the due date indicated elsewhere in this solicitation. Preliminary proposals must conform to the format restrictions noted in the NSF GPG and contain only the permitted sections listed below. Note that no supplementary documents are allowed in a CCI Preliminary Proposal.

Cover Page. Please indicate the solicitation number and also check the "preliminary proposal" box. Only the PI's name should

appear on the cover page. The budget request should read \$1.

Project Summary. In one page describe the intellectual merit and broader impacts of the project. Note that proposals that do not address the intellectual merit and broader impacts of the activity will be returned without review.

Project Description. Limited to 5 pages. CCI preliminary proposals are likely to be read by non-specialists at some stage of the review process. It is therefore particularly important that they be written to emphasize their impact on chemistry in a broad context. The project description should address the following points

- The research challenge to be addressed and the vision for the CCI (both Phase I and Phase II), relevance to sustainable chemistry (approximately 1 page)
- Phase I Research Plan, including the group of initiating investigators, an outline of the initial research goals and how these will link to the Phase II research goals, and other plans to develop the research required for Phase II (approximately 3 pages)
- Brief summaries of plans for innovation, education and professional training, broadening participation, public science outreach, and center management (approximately 1 page).

Reference Section. Up to 10 key references.

Biographical Sketches. Include a two-page biographical sketch for PI and other senior personnel, using the standard GPG guidelines.

Current and Pending Support. List all current and pending research support for PI and other senior personnel.

Single Copy Documents. Single Copy Documents are used by NSF staff, but are not available to the reviewers.

- Suggested Reviewers and Reviewers Not to Include (optional)
- If applicable, a statement excluding other federal agencies from seeing your preliminary proposal and reviews.

Preliminary Proposals will be merit reviewed by ad hoc and/or panel review. The PIs of proposals judged to be meritorious will be invited to submit Phase I full proposals (below).

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (<http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

Phase I Proposals

Full Proposals submitted, by invitation only, in response to this program must originate from Principal Investigators whose projects are successful in the Preliminary Proposal competition described above and must be based on those projects. All proposals not meeting this requirement will be returned without review. Proposers are strongly encouraged to consult the proposal submission instructions in the GPG or NSF Grants.gov Application Guide as they prepare their proposal. Proposals not compliant with the proposal preparation guidelines, as supplemented by the following instructions, may be returned without review.

Project Summary. One-page limit, including the names and affiliations of all senior personnel. The project summary must address both the intellectual merit and broader impacts of the proposed CCI project.

Project Description. CCI proposals are likely to be read by non-specialists at some stage of the review process. It is therefore particularly important that they be written to emphasize their impact on chemistry in a broad context. The Project Description may be up to 25 pages and must contain the following elements:

- Research Plan. Narrative, up to 15 pages, consisting of the following:
 - A justification for why the CCI mode of research is appropriate (compared with individual or collaborative awards);
 - A justification for the project contributing to Sustainable Chemistry;
 - A brief description of the contribution to be made by each CCI Phase I senior investigator;
 - A description of the research proposed in Phase I; and
 - A description of workshops, conferences or other activities appropriate for developing the research project, team and partners in preparation for Phase II.
- Integrative CCI Components. Up to 1 page for each component, including discussion of how these activities will be integrated with the research and other activities of the CCI. The following integrative components must be included:
 - Plan for innovation, including identification of research that has the potential for innovation, resources available to assist with innovation efforts, and the overall strategy the CCI will use to promote innovation.
 - Plan for education and professional training, including co-mentorship or other collaborative training of undergraduate and graduate students. Role of postdoctoral researchers (Note: Each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals). Education in various aspects of innovation (intellectual property, entrepreneurship, etc.) Any other education activities.
 - Plan for broadening participation of underrepresented groups, including the CCI goals, plans for achieving those goals, and a discussion of how progress will be measured.
 - Plan for public outreach, describing the CCI approach to communicating chemistry research to public audiences

- and possible ways to evaluate the impact of these outreach efforts.
- Plan for center management, including how the CCI efforts will be monitored, evaluated and altered as needed; coordination of the CCI effort and partnerships, including any use of cyberinfrastructure; how decisions will be made regarding the project (including plans for advisory groups); and a discussion of how agility will be addressed in terms of the incorporation of new ideas, tools, and partners.
- Results of Prior Support. Up to 5 pages. List all NSF awards held in the last five years by any investigator (PI and any other senior personnel). Each PI and senior personnel will also provide a brief summary on the award most closely related to the proposal.

An external advisory board is optional during Phase I. Please do not name prospective members of the external advisory board or include letters of commitment from prospective members in this Phase I proposal.

References Cited. References should include full titles of articles and book chapters cited. This section should include bibliographic citations only and must not be used to provide parenthetical information outside of the Project Description. Indicate with an asterisk (*) references co-authored by two or more proposal investigators.

Biographical sketches. For PI and all senior personnel, provide brief biographical sketches using the format described in the Grant Proposal Guide. Note that recent collaborators and other affiliates should also be collected into a combined list and submitted as a Single Copy Document (see below).

Budget. The aggregate budget for a Phase I CCI should total up to \$1,750,000. The budget should clearly include funding for center development activities (website, strategic planning, travel for reverse site visits, etc.) in addition to other center activities. The annual budgets can vary in amount, a cumulative budget will be automatically generated by Fast Lane. A detailed budget justification (up to three pages) should document proposed expenses. Multi-institutional proposals should use the award-sub award proposal mechanism (see GPG guidelines).

Current and Pending Support. A full description of the total level of current and pending support from all sources for the PI and senior personnel. Any potential overlap between federally funded projects and the proposed research must be clarified.

Facilities. A description of the facilities (including laboratories, computational facilities and cyber infrastructure) that will be made available to the project. Separate facilities descriptions should be included for multi-institutional projects or those involving non-academic partners.

Supplementary Documents. Supplementary materials are available to reviewers and may include:

- Postdoctoral Mentoring Plan. **Required if requesting funds for postdoctoral researchers. Proposals not meeting this requirement will be returned without review.** See GPG for further guidance.
- Data Management Plan. Describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans.
- Letters of collaboration, including those from industrial, government and/or international partners. Letters of recommendation or general support are not permitted.
- Quotes for the purchase of instrumentation or other budget documentation.

Single Copy Documents. Single Copy Documents are used by NSF staff, but are not available to the reviewers. Single Copy Documents may include:

- Suggested Reviewers and Reviewers Not to Include (optional).
- A combined, alphabetized list of all scientists, with current affiliations, who have collaborated with the PI and other senior personnel in the last 48 months or are otherwise affiliated with these individuals.
- If applicable, a statement excluding other federal agencies from seeing your proposal and reviews.

Phase II Proposals

CCI Phase II proposals submitted in response to this program solicitation must originate from teams whose projects have been supported by a CCI Phase I award (FY2009-FY2011) and be based on those projects. Proposals not meeting this requirement will be returned without review.

Proposal authors are strongly encouraged to consult the proposal submission checklist included in the Grant Proposal Guide (GPG) as they prepare their proposal. Proposals not compliant with the proposal preparation guidelines, as supplemented by the following instructions, will be returned without review.

The items outlined below pertain to the corresponding sections in the GPG.

Project Summary. One page limit, including the names and affiliations of all senior personnel. The project summary must address both the intellectual merit and broader impacts of the proposed Phase II Center.

Project Description. A total of up to 35 pages (40 pages for renewing Phase II CCIs), as described below:

- Prior Support. 5 pages, report on the results from the CCI Phase I program. (10 pages for Phase II projects seeking renewal). No results from other prior support should be included.
- Proposed CCI Research, 20 pages, consisting of the following items:
 - An explanation of the scientific context, intellectual merit, relevance to chemistry and timeliness of the proposed Center;
 - A justification of the need for a Phase II CCI;
 - A description of the contribution to be made by each senior investigator; and
 - A description of the proposed research
- Integrative CCI Components, including discussion of how these activities will be integrated with the research and other activities of the CCI:
 - Plan for innovation, not to exceed 2 pages, that includes:
 - Identification of promising research from the CCI's research portfolio that can and will be translated into innovations;
 - Identification of university and external resources, expertise, stakeholders, as well as other potential allies to aid in the translation of the research to innovations;
 - Discussion of how intellectual property will be developed and managed;
 - Summary of the innovation plan including goals, intended outcomes, resources required to validate need for the intended innovation and translation options; and
 - Plans for monitoring and evaluating efficacy of the plan for innovation.
 - Plan for education and professional training, not to exceed 2 pages, describing:

- The education and professional training plan for undergraduate and graduate students, including co-mentorship or other collaborative training;
 - Plans for education in various aspects of innovation; and
 - Plans for monitoring and evaluating efficacy of the plan for education and professional training.
 - Role of Postdoctoral Researchers (Note: Each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals).
- Plan for broadening participation by underrepresented groups, not to exceed 2 pages, describing:
 - The broadening participation goals to be addressed;
 - Plans for achieving those goals, including explanation of resources to be used and how these efforts are anticipated to improve on your current diversity; and
 - Plans for monitoring and evaluating efficacy of the plan for broadening participation by members of underrepresented groups.
- Plan for public outreach, not to exceed 2 pages, describing:
 - Plans to disseminate the results of your center's work and achievements with a broader public audience;
 - Plans to increase the visibility and public appreciation of chemistry; and
 - Plans for monitoring and evaluating efficacy of the plan for public outreach.
- Plan for center management, not to exceed 2 pages, describing:
 - How the research and integrative components of the CCI will be monitored, evaluated and altered as needed;
 - How the center effort and partnerships will be coordinated, including any use of cyberinfrastructure;
 - How decisions will be made regarding the conduct of the project, including plans for and responsibilities of advisory groups; and
 - A discussion of how agility will be addressed in terms of the incorporation of new ideas, tools, and partners.

An external advisory board will be required to provide guidance and advice to the CCI on all activities. It is not required to assemble members at this stage. Please do not name prospective members of the external advisory board or include letters of commitment from prospective members.

References Cited. References should include full titles of articles and book chapters cited. This section should include bibliographic citations only and must not be used to provide parenthetical information outside of the Project Description. Indicate with an asterisk (*) references from work on the CCI Phase I project or the first five years of a CCI Phase II.

Biographical Sketches. For PI and all senior personnel, provide brief biographical sketches using the format described in the GPG. Note that recent collaborators and other affiliates should also be collected into a combined list and submitted as a Single Copy Document (see below).

Budget. Include five annual budgets of up to \$4,000,000, one for each year of the duration of the award; a cumulative budget will be automatically generated by FastLane. Multi-institutional proposals should use the award-sub award proposal mechanism. Subaward budgets should be included with this proposal. A detailed budget justification (up to 3 pages) should document proposed expenses.

Current and Pending Support. A full description of the total level of current and pending support from all sources for the PI and senior personnel. Intellectual overlap between any federally funded or proposed projects and the proposed research must be clarified.

Facilities. A description of the facilities (including laboratories, computational facilities, and cyberinfrastructure) that will be made available to the project. Separate facilities descriptions should be included for multi-institutional projects or those involving non-academic partners.

Supplementary Documents. Supplementary materials are available to reviewers and may include:

- Postdoctoral Mentoring Plan (required if requesting funds for postdoctoral researchers). See GPG for further guidance.
- Data Management Plan (see GPG for further guidance).
- Letters of collaboration, including those from industrial, government and/or international partners. Letters of recommendation or general support are not permitted.
- Quotes for the purchase of instrumentation or other budget documentation.

Single Copy Documents. Single Copy Documents are used by NSF staff, but are not available to the reviewers. Single Copy Documents may include:

- Suggested Reviewers and Reviewers Not to Include (optional)
- A combined, alphabetized list of all scientists, with current affiliations, who have collaborated with the PI and other senior personnel in the last 48 months or are otherwise affiliated with these individuals.
- If applicable, a statement excluding other federal agencies from seeing your proposal and reviews.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Multi-institutional proposals should use the award-subaward mechanism discussed in the GPG. A single proposal and budget should be submitted, with subawards administered by the lead institution.

Budget Preparation Instructions:

Phase I CCI awards total up to \$1,750,000 over three years. Phase I proposals should include funds in the budget for center development activities, including websites, strategic planning workshops and travel for center personnel to participate in reverse site visits.

Phase II CCI awards are up to \$4,000,000 per year for five years. Phase II proposals should include funds in the budget for CCI personnel to participate in site visits or reverse site visits in the second and fourth years of the project.

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):

October 05, 2011

Phase I preliminary proposals

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 25, 2011

Phase II full proposal

March 27, 2012

Phase I full proposal, by invitation only

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the

proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

Additional Solicitation Specific Review Criteria

In addition to the National Science Board merit review criteria, reviewers will be asked to apply the following criteria when reviewing CCI proposals:

For Phase I preliminary proposals and full proposals:

- Does the proposal have the potential to lead to transformative research in chemistry?
- Is the need for a center effort well-justified in the proposal?
- Does the proposal present a convincing plan for innovation?
- Does the proposal present a convincing plan for education and professional training?
- Does the proposal present a convincing plan for broadening participation?
- Does the proposal present a convincing plan for public outreach?
- Does the proposal present a convincing plan for center management? Will the management plan be effective in promoting effective and agile research teams with a high tolerance for risk?

Site visits and reverse site visits during Phase I may be part of the CCI Phase II review process.

For Phase II proposals:

- Does the project build upon novel and significant results achieved in Phase I?
- Are the scientific goals ambitious and appropriate for a CCI Phase II?
- Does the proposal present a convincing argument that a Phase II Center will lead to transformative research in chemistry?
- Does the proposal present a convincing plan for innovation?
- Does the proposal present a convincing plan for education and professional training?
- Does the proposal present a convincing plan for broadening participation?
- Does the proposal present a convincing plan for public outreach?
- Does the proposal present a convincing plan for center management? Will the management plan be effective in promoting effective and agile research teams with a high tolerance for risk?

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Site Visit Review.

Phase I preliminary proposals will be reviewed by panel, with ad hoc reviews if necessary for particular expertise. Phase I full proposals will be reviewed by a combination of ad hoc and panel review.

Phase II proposals will be reviewed by ad hoc review followed by a site visit or reverse site visit.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a

grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational), publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Katharine Covert, Program Director, 1055, telephone: (703) 292-4950, fax: (703) 292-9037, email: kcovert@nsf.gov
- Robert L. Kuczkowski, Program Director, Directorate for Mathematical & Physical Sciences, Division of Chemistry, telephone: (703) 292-4454, email: rkuczkow@nsf.gov
- C. Michelle Jenkins, 1055, telephone: (703) 292-7874, email: cjenkins@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

- C. Michelle Jenkins, 1055, telephone: (703) 292-7874, email: cjenkins@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

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